

Small Sub-Micron-Particle Position-Resolving Laser-Doppler Velocimeter for High-Speed Flows, Phase I

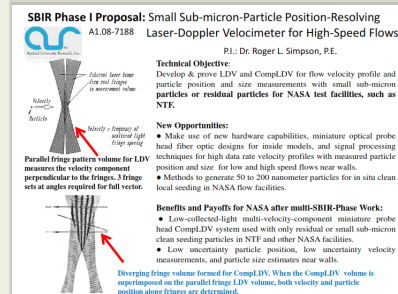
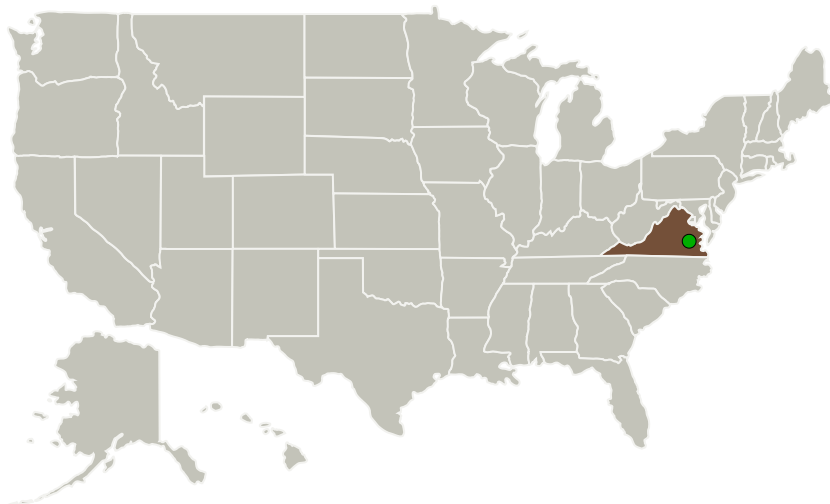
Completed Technology Project (2016 - 2016)



Project Introduction

The technical objectives of this proposed work are to develop and prove the use of LDV and ComplDV for particle-position-resolving and flow velocity profile measurements using small sub-micron particles or facility-residual particles in higher speed test flows, making use of new hardware capabilities, miniature optical probe head designs for versatile use in facilities and models, and signal processing techniques that have not been simultaneously implemented. With the optical system feature, the expected results from this multi-SBIR-Phase work are improved low-collected-light LDV technology and a completely functional multi-velocity-component ComplDV system that can be used with only facility residual or small sub-micron seeding particles in low-speed and high-speed flow facilities for low uncertainty particle position and low uncertainty velocity profile measurements. Methods to generate 50 to 200 nanometer particles and clean evaporating particles for in situ local seeding in flow facilities appear to be possible and need to be examined for practical implementation in NASA facilities. Phase-Doppler anemometry signal processing will be used to determine the size of larger particles. The known measurement volume fringe light intensity variation for the LDV and ComplDV and light scattering theory also will be used to determine an estimate of particle size.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Applied University Research, Inc.	Lead Organization	Industry	Blacksburg, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Virginia

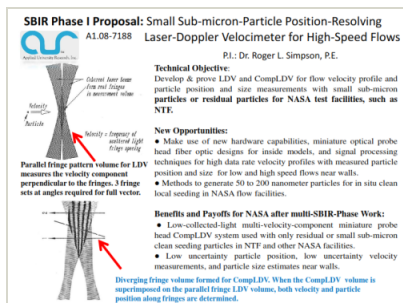
Project Transitions

**June 2016:** Project Start**December 2016:** Closed out

Closeout Documentation:

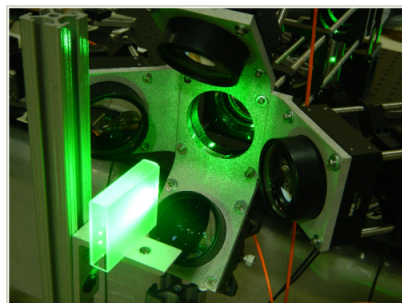
- Final Summary Chart(<https://techport.nasa.gov/file/140222>)

Images



Briefing Chart Image

Small Sub-micron-Particle Position-Resolving Laser-Doppler Velocimeter for High-Speed Flows, Phase I
(<https://techport.nasa.gov/image/128081>)



Final Summary Chart Image

Small Sub-micron-Particle Position-Resolving Laser-Doppler Velocimeter for High-Speed Flows, Phase I Project Image
(<https://techport.nasa.gov/image/129691>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Applied University Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

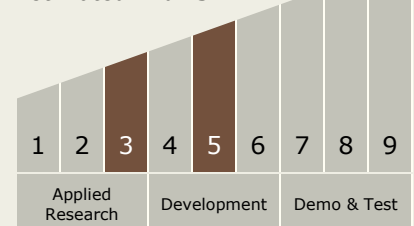
Roger L Simpson

Technology Maturity (TRL)

Start: 3

Current: 5

Estimated End: 5



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.1 Aerodynamics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System